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1. INTRODUCTION

Violence in Mexico has escalated significantly since the federal government initiated a war against organized crime. Specifically, violence has swollen in the local states in which the government has had clashes with the criminal organizations. The intentional homicide rate per 100 thousand inhabitants increased from 8 to 18 from 2007 to 2008, and since then, it has increased every year until 2011. Since 2006, 25,000 forced disappearances have been reported by the federal government (Human Rights Watch, 2013). However, up to now, the government has not recognized the existence of the internally displaced population (IDP) and there is not data to assess the magnitude of the problem neither to estimate the economic consequences of that displacement.

This paper analyzes internal migration within Mexico. The objective is to determine whether migrants are moving because they are pursuing better economic opportunities, or because of noneconomic reasons, such as looking for safer conditions to live. Our empirical exercise consists on assessing how important is the wage differential on the different migration decisions. If economic factors do not explain why people migrate from the most violent states, this might suggest that a different migration is taking place, and those high rates of criminality could cause such movements of migrants. If that was the case, results of this paper would be an initial motivation to analyze displacement by violence as one of the explanations for the internal migration in Mexico.

Three sources of data are used to estimate the probability of migration to and from the most violent states in the country, as function of the socioeconomic characteristics of the migrants, the individual wage differential between origin and destination as well as the differences in the costs of living between both places. The data used come from the Population and Housing Census of 2010, the Income and Expenditure Survey of 2010, and the alleged homicides related to the organized crime published by the National Security Council (2006-2010). Because we cannot observe the wage the migrant would have earned if she/he had not migrated, we use techniques derived from the counterfactual literature (Dehejia and Wahba, 1999) to estimate these potential wages, and thus, the individual wage differential.

The contributions of this work are both related to research on displacement and to the econometric technique used for the analysis. Regarding the knowledge of displacement in Mexico, this article adds to the almost inexistent quantitative literature of IDPs in the country. The phenomenon has been described qualitatively in academic articles (see Durin, 2012; Velázquez, 2012), and using anecdotal information in articles published on newspapers and political opinion magazines. However, since there is no registry or other source of data to quantify the number of IDPs, quantitative efforts are limited (a description of these articles is included in section two below). On the other hand, this paper uses the existent counterfactual literature in an innovative way to estimate the potential wages *individually* for each migrant if she/he would have decided not to migrate. In contrast with traditional migration studies that calculate the wages as an average for each region (see Harris & Todaro, 1970; or Lall et al., 2006 for a review), we consider that each wage depends mainly on the individual characteristics of workers and how these characteristics are evaluated at the local job markets. This econometric approach can be extended to other countries with similar data constraints.

The findings of this article suggest that there are two different internal migration flows in Mexico: the first one is the migration from nonviolent to violent states, and the second one is the migration from violent to nonviolent states (the categorization of violent and nonviolent states is explained in section three below). The main determinants for migration in the economic migration theory, i.e. economic opportunities and education, are not explaining migration from violent states to nonviolent states. Moreover, when the model controls for differences in the cost-of-living level it is observed that people migrating from violent to nonviolent states are willing to migrate even if the destination has more expensive living prices, situation not observed in the case of migrants moving from nonviolent to violent states. For the latter, the economic migration expectations are fulfilled: the wage differential and the level of education are the main determinants for the migration decision.

The results of this article are relevant because of the consequences that migration due to violence could have. According to our results, the noneconomic factors seem to play a role, and specifically the violence appears as a relevant factor to explain migration from violent to nonviolent states. If this is the case, it is imperative to assess the social and economic consequences caused by this migration: not only a humanitarian crisis could be generated in the recipient locations, but also, it could break the equilibrium of the local job markets in the places of origin and destination. Although Mexico does not have an official registry for measuring displacement, if the phenomenon truly exists, this lack of information implies a limited knowledge about the reasons behind this migration, especially those related to the economic perspectives faced by migrants in their new localities. We sustain that, in order to evaluate the total cost of the displacement due to violence, it is important, not only to recognize the social cost faced by this population, but also the potential loses on economic welfare.

The rest of the paper is organized as follows: section two below summarizes the main literature on forced displacement in Latin America. Section three describes the data used in the empirical approach. The econometric models are explained in section four. Section five analyses the results and section six concludes and provides policy implications for the case of Mexico.

2. DISPLACEMENT AND FORCED MIGRATION IN LATIN AMERICA

Efforts to quantify the number of IDP in Mexico are limited. According to the Internal Displacement Monitoring Centre, the total number of displaced population in Mexico in 2007 due to the war against organized crime is 160,000 without considering other 115,000 who have crossed the border to the U.S. (IDMC, 2012). On the other side, the firm *Parametría* (2012) suggests that the displaced population is about 1.6 million. The most robust approach on quantifying the problem, at least at the local level, was a survey conducted in 2009 by the *Universidad Autónoma de Ciudad Juárez* to families of individuals that have left their homes. According to their results, only in Ciudad Juárez, 230,000 migrated because of the escalating violence between 2007 and 2009; 46% of these migrants remained in the country as IDPs and the rest crossed the U.S. border (Velazquez Vargas, 2012).

Despite the lack of official data for quantifying IDPs in Mexico, there have been some efforts to study this phenomenon. For instance, Durin (2013) estimates the displaced population at the municipal level analyzing the rate of unoccupied properties in 2005 and 2010. According to her estimates, Tijuana is the municipality with the highest number of IDPs (160,000), and just in the Northern states, there has been 420,000 IDPs from 2005 to 2010. Rios Contreras (2014), on the other hand, estimates unexpected changes in population in each municipality as function

of crimes related to the organized crime, finding that municipalities with greater levels of drug-related violence had greater unexpected out-migration flows than other municipalities in the country.

Velazquez Vargas et al. (2010) and Albuja (2011) also mention the rate of abandoned properties in the northern states as one of the consequences of forced displacement due to violence. Although it is not possible to identify how many of these properties are abandoned because families fled from violence, the authors claim that there is enough evidence to suggest the existence of displacement, case in which the government should provide protection under the Guiding Principles on Internal Displacement.[i]

Different journalists have collected anecdotal evidence about the IDPs. *Animal Político* (2013), in collaboration with Insight Crime, conducted three case studies in Sinaloa, Tijuana and Ciudad Juarez reporting the existence of IDPs by interviewing several families that have left their homes fleeing from violence (Sandoval Alarcón, 2013a, 2013b, 2013c). In the three cases, the rise in the crime rates was associated to an increase of the IDPs. However, when the local government authorities were asked about the topic, they denied its existence, or simply argued that there is not enough evidence of displacement to recognize it as a problem (Sandoval Alarcón, 2013a).[ii]

Internal migration due to violence has been studied for countries in the region that have suffered from political violence and civil wars. In Colombia, The *Universidad de Los Andes* conducted a survey in 2004 to 2,342 displaced households located in 48 municipalities in 21 departments (Ibañez and Velasquez, 2006). Several studies have used this survey to estimate the costs of displacement and the main reasons driven the forced migration in the country (Lozano-Gracia et al; 2010; Engel & Ibañez; 2007. See Ibañez, 2009 for a review).

In Central America, several scholars have documented the effect of political violence on migration during the decade of 1980s. A migration model estimated for El Salvador (Stanley, 1987) found evidence of political violence accounted for more than half of the Salvadorian apprehensions in the U.S., suggesting that the fear for violence is a dominant motivation of migration. Morrison & May (1994) estimated migration in Guatemala using a maximizing utility framework in which an individual could decide to migrate to an area with a lower expected income but with more peace and tranquility finding a nonlinear effect of violence in migration. Finally Lundquist & Massey (2005) find that the Nicaraguan migration to the US in the 1980s was linked to the level of Contra War violence, independent of economic motivations. However, they conclude that the line that separates economic than political migrants is often artificial and in most cases, the political motivations cannot be distinguishable from the economic ones.

3. DATA USED AND SUMMARY OF STATISTICS

We use mainly three sources of data to carry out our estimations. The first one comes from the National Security Council (CNS) to define the level of drug-related violence at the state level; the second one from the sample of the Population and Housing Census of 2010 to identify the internal migrants and obtain their wages and personal characteristics; and the third one from the Income and Expenditures Survey of 2010 used to calculate the spatial price index at the state level.

The number of alleged homicides related to organized crime in the period 2006-2010 by municipality in Mexico were collected by the National Security Council (CSN). A homicide was classified as drug-related when the authorities determined that it could have been related to drug trafficking activities (Rios, 2012). Using the homicide rate per 100,000 habitants, the states were classified depending on the level of violence. Since this information is not available for 2005, the

average homicide rate from 2006 to 2009 is used to determine the level of violence of the states before 2010 (when the migration took place). According to Figure 1, the homicide rate for 2010 is used for the same year. Before 2010, states with homicides rates greater than 9 per 100 thousand habitants are classified as states with high levels of violence, states with homicide rates between 9 and 6 are classified as mid-violence states, and states with homicide rates below 6 are classified as states with low level of violence. In 2010, high-violence states are those with a homicide rate greater than 15, mid-violence states are states with a homicide rate between 2.5 and 15, and states with a homicide rate lower than 2.5 are classified as low-violence states.

<Figure 1 here>

Most violent states before 2010 were Chihuahua, Sinaloa, Durango and Baja California with homicide rates per 100,000 habitants of 16.45, 9.98, 8.88 and 7.63, respectively. In 2010, the most violent states were Chihuahua, Sinaloa, Durango, Tamaulipas and Nayarit with rates of 176, 98, 70 and 52, respectively. These states experienced an enormous increase in their homicide rates. The rate of Chihuahua, for example, increased in 1,619%, while the one for Durango increased in 613%, and for Sinaloa in 299%. These changes are not surprising given that most of the narcotrafficking activity has been concentrated in these areas.

The second source of information is the sample of the Population and Housing Census of 2010. Population censuses in Mexico are conducted every five years and the sample has 3.6 million individual observations, representing 3.28% of the total population. The questionnaire includes information about the place of living in 2005, but it does not include questions regarding the reason of migration or whether this migration was temporary or permanently. Moreover, the individuals do not have a unique identification number in order to match their information for different years in a panel structure. Then, for the purposes of the estimation, an

internal migrant was defined as a person who was living in a different state in 2005. According to this rule, 109,180 people (2.96% of the Census sample) are considered internal migrants. On the contrary, residents are defined as those who did not change their state of residence from 2005 to 2010.

Migrants were classified into groups according to the level of violence of their states of origin and destination. For each migrant, socioeconomic characteristics such as age, gender, education, marital status, economic activity, housing status, and size of the community where they are living are also collected by the Census. Table 2 shows the number of migrants coming and going to low-, mid-, and high-violence states as percentage of the total number of residents in each of these states.

<Table 1 here>

According to the data, and using expansion factors, 13.3 workers lived in states with low levels of violence in 2010, 17.7 million in states with mid-level of violence, and 8.2 million in states with high levels of violence. The main destination of the internal migration in Mexico seems to be to states with low levels of violence, regardless the level of violence in the state of origin. For example, the total percentage of migrants arriving to states with low level of violence is 2.59%, while this percentage is only 1.74% when the destination is a state with high level of violence. However, internal migrants move within the same group of violence. For instance, 3.26% of migrants coming from high-violence states are moving to other high-violence state, and only 2.04% of them migrate to a state with low level of violence.

Table 2 shows a summary of statistics for the socioeconomic characteristics of migrants coming from states with low, mid- and high levels of violence. Columns A, B and C show the

mean (and the standard deviations in parenthesis) for each of the variables in each group. The differences of the means between each group (and its standard errors in brackets) are shown in Column D, E and F.

<Table 2 here>

On average, migrants coming from states with high level of violence are younger than migrants from states with low or mid-level of violence. The 69% of them are also male and 64% are married, compared to 66% male and 63% married migrants coming from low-violence states. People moving from states with high-level of violence also have lower education and on average, live in smaller municipalities than those coming from low-violence states. In terms of income, and before correcting by the price index, migrants coming from high-violence state report having a lower income in 2010 than those coming from low-violence states. While the former reported on average an income of MX$6,075, the latter reported MX$6,274. Most of the mean differences between groups are statistically significant, with the exception of monthly income.

4. EMPIRICAL MODEL

Since our empirical strategy requests the comparison of wages for the same individual in the same year, but for two different states, we use the matching literature to estimate the unobservable (counterfactual) wage of the migrant if she/he would have decided not to migrate. The next subsections describe first a general description of the counterfactual problem and, subsequently, the econometric strategy used in the analysis.

4.1.Estimating potential wages and the wage differential

To start with a general description of the problem, let J be the total set of workers living in the state j by 2005. By 2010, the whole set of J is divided between all those workers who did

not migrate (residents of j or R_j), and those workers who migrate to any of the other 31 states different than j (migrants from j or M_j); where $M_j \cup R_j = J$ represents the total population of state j by 2005. Define an indicator random variable $T^i = 1$ for the treatment of *migrant* and $T^i = 0$ for the treatment of *resident*.[iii] Each worker $i \in J$ has two wages by 2010: $w^i(1)|T^i = 1$ and $w^i(0)|T^i = 1$, but only the first wage can be observed by the data (wage of the migrant worker in the state she/he is living in 2010). The second term is the unobservable counterfactual because it represents the *potential* wage of a migrant as if he/she had stayed at his/her residence state of 2005. Given that we cannot observe the second term, we cannot compute the wage differential $\Delta w_i = (w^i(1)|T^i = 1 - w^i(0)|T^i = 1)$ and it is impossible to compute the effect of Δw_i on the migration probability.

Most of the literature has overcome this problem using the average wage differential between R_j and M_j as an explanatory variable for explaining the migration probability (Antolin & Bover, 1997; Dustmann, 2003).[iv] However, counterfactual literature has widely discussed the selection bias behind this naïve approach (Angrist and Pischke, 2008). For discovering this bias, note that the mean wage of residents is expressed by $E\,(w^i(0)|T^i = 0)$, and the mean wage of migrants, by $E\,(w^i(1)|T^i = 1)$. The average difference of wages between residents and migrants in 2010 is given by:

$$\begin{aligned} E\big(w^i(1)\big|T^i = 1\big) - E\big(w^i(0)\big|T^i = 0\big) \\ = \big[E\big(w^i(1)\big|T^i = 1\big) - E\big(w^i(0)\big|T^i = 1\big)\big] \\ + \big[E\big(w^i(0)\big|T^i = 1\big) - E\big(w^i(0)\big|T^i = 0\big)\big] \end{aligned} \qquad (1)$$

The Average Treatment Effect (ATE) of migration (first bracket in the right hand side) and the selection bias (second bracket in the right hand side) compose this naïve average effect. The estimation includes a selection bias if the expression in the second bracket is different from

zero, i.e. $\left[E\ (w^i(0)|T^i = 1)\ - \mathrm{E}\ (w^i(0)|T^i = 0)\ \neq 0\right]$, and its magnitude would distort the real ATE. To solve this problem, a sample proxy for $w^i(0)|T^i = 1$ is used. In other words, using matching techniques, a similar group of residents to all migrants is found, and the marginal value of their characteristics on their wage is calculated to estimate the potential wage for each migrant.

By defining a set of X individual characteristics for both, residents R_j and migrants M_j, a Coarsened Exact Matching (CEM) is estimated for identifying a subset of residents $R_j^* \subset R_j$ who are the most similar to migrants M_j (See Iacus et al., 2011 for a theoretical discussion, and Jamett & Paredes 2014 for an empirical analysis). After this matching process, a weight variable p_j is assigned to each observation of J, namely for R_j and M_j. For the case of R_j, a low value of p_j indicates a low similarity with migrants, while high values of p_j indicate a high similarity. If this weight variable reports a zero value for any worker $i \in R_j$, the observation is then deleted from the resident group. In other words, R_j^* is defined as any resident i with $p_j > 0$. According to Rubin and Ronsenbaum (1983), the independence assumption indicates that the similarity of X between migrants and residents eliminates the bias selection above described. With respect to M_j, almost all of them have a variable $p_j = 1$ conforming the group M_j^*. Just a few of them will report $p_j = 0$ which means that they have very particular characteristics that are not shared with R_j. After this exercise, there are two groups of comparable workers R_j^* and M_j^* with similar X variables and wages.

To observe the intuition behind the matching exercise, the percentage of R_j and M_j included in R_j^* and M_j^*, respectively, are shown in Table 3, as well as the description of the statistics of the weights estimated by the CEM for R_j^* (all the observations included in M_j^* have a

$p_j = 1$). Such as discussed above, not every resident in every state receive a weight greater than zero. Thus, the CEM allows to include only residents that are somehow similar to the migrants, and these selected residents are also weighted according on how similar they are to the treated observations, avoiding the potential problems related with selection bias reported by equation (1). The advantage of using the CEM over other methods based on Propensity Score Matching (PSM) is that the matching process is conducted over the whole vector of characteristics rather than just the propensity score which allows to find controls with the *exactly* the same characteristics as the treated observations. Additionally, CEM weights are estimating depending on their similarity to the treated group, being more important the more similar observations (higher weights) and less important the less similar observations (lower weights). These calculations have evident consequences on the efficiency of the estimation process.

According to Table 3, the total number of residents in the 32 states in Mexico in 2010 were 2,8 million, and 96.8% of those receive a CEM weight (p_j) greater than zero. From the 96.8% of the selected residents with a positive weight, roughly 60% have a weight lower than one, meaning that, even if they were selected for being similar to the migrants, they are not the best matches the CEM could find. On the contrary, approximately 40% had a CEM weight greater that one being these residents the best clones because of their similarity to the migrants. The 50th percentile of the CEM median weight (p_j) for the residents included in R_j^* is 0.8709, while the 25% percentile is 0.5362 and the 75% percentile is 1.2812. On the other side, the total number of migrants was 259,632 and the matching process found a clone for 99.6% of them, or equivalently, the 0.4% of them are not a comparable group with the residents.

<Table 3 here>

Once we define M_j^* and R_j^*, a Mincer's equation and the hedonic theory of wages are used to estimate the marginal economic value of each human capital variable (Rosen 1974, 1979). The equation is estimated for each state j using only the observations included in the group R_j^*, since they compose the local labor market of the migrant if she/he would not have migrated; markets where we want to calculate the counterfactual wages. The Mincer's equation estimated is:

$$\ln w_i = \gamma_0 + \gamma_1 X_i^1 + \cdots + \gamma_h X_i^h + u_i \quad \forall \quad i \in R_j^* \qquad (2),$$

where each coefficient γ_h represents the marginal value of the characteristic h in the labor market of R_j^* for the year 2010. Equation 2 is weighted with p_j of the group R_j^* which is comparable to M_j^*. Later these estimators are used to calculate the *potential wages for migrants M_j^* if they would have decided to stay in the same state they were living in 2005*, but considering the economic return to human capital in 2010. In particular, the potential wage of a migrant i if she/he would have decided to stay in state j is calculated applying the estimated coefficients, $\hat{\gamma}_0, \hat{\gamma}_1, \ldots, \hat{\gamma}_K$ obtained from equation 2 to her/his own human capital X:

$$\ln \widehat{w_i} = \widehat{\gamma_0} + \widehat{\gamma_1} X_i^1 + \cdots + \widehat{\gamma_h} X_i^h \quad \forall \quad i \in M_j^* \qquad (3)$$

Finally, using this potential wage and the current wage observed by the data, the wage differential for each migrant is calculated. The wage differentials are the difference between the current wage of 2010 and the potential wage (the wage the migrant would have earned if she/he would have stayed in the same state as in 2005):

$$\Delta w_i = \ln \widehat{w_i} - \ln w_i \qquad (3)$$

where $\ln \widehat{w_i}$ is the potential wage for individual i estimated in the first step, and $\ln w_i$ is the wage of individual i reported by the Housing and Population Census.

Additionally, in order to control for differences in the cost of living among states, a price index is built as a control variable, calculated as the difference between the rent prices of 2010 for both the state where the migrant was living in 2010, and the state the migrant was living in 2005:

$$\Delta r_j = \ln r_{j2010} - \ln r_{k2005} \qquad (4)$$

where $\ln r_{j2010}$ is the logarithm average 2010 rent prices of the j state where the migrant was living in 2010, and $\ln r_{k2005}$ is the logarithm average 2010 rent prices of the k state where the migrant was living in 2005.[v] While the wage differential (in equation 3) is measured at the individual level, the rent differential (in equation 4) is measured at the state level.

4.2. Estimating the probability of migration for different migration flows

Migrants are categorized depending on the level of violence of the state they were living in 2005 and on the state they migrated in 2010. For example, such as Table 4 shows, the group *H05toL10* are those migrants who were living in a violent state before 2010 and migrated to a nonviolent state in 2010; and *L05toH10* are those who lived in a nonviolent state before 2010 and migrated to a violent state in 2010.

<Table 4 here>

The probability of migration from a violent state to a nonviolent state is estimated regressing the binary variable *H05toL10* as function of the wage differential and its square term,

the price index between the two places (origin and destination), and its square term, and the characteristics of the migrant such as sex, age, age squared, educational level, marital status and size of the locality where she/he was living in 2010. The square terms are included to evaluate any potential non-linear effect derived from the control variables. For comparison, the probability of migration from a nonviolent state to a violent state is also estimated as a function of the same variables (*L05toH10*). The two models are the following:

$$H05toL10_i = \beta_0 + \beta_1 \Delta w_i + \beta_2 \Delta {w_i}^2 + \beta_3 \Delta r_j + \beta_4 \Delta {r_j}^2 + \beta_5 X_i + u_i \quad (5),$$

$$L05toH10_i = \beta_0 + \beta_1 \Delta w_i + \beta_2 \Delta {w_i}^2 + \beta_3 \Delta r_j + \beta_4 \Delta {r_j}^2 + \beta_5 X_i + u_i \quad (6),$$

where *H05toL10* and *L05toH10* are the binary migration decision; Δw_i is the wage differential for migrant i; Δr_j is the 2010 price index capturing the differences in rent prices between the state where the migrant was living in 2010 and the state where the migrant was living in 2005; and X_i are the socioeconomic characteristics of the migrant.

According to the vast literature on migration's determinants, the marginal effect associated with the wage differential should be positive and very significant. If the wage differential is not significant (statistically or economically) for explaining why people move from violent states to nonviolent states, this result could open space for supporting this paper's hypothesis: people fleeing from violence are willing to lose money in order to move out from the violent situation they are facing. On the other side, migrants coming from low-violence states moving to high-violence states are expected to demand a larger economic incentive to move in order to compensate for their safety loses. Then, the wage differential coefficient should be much greater and significant for them than for other types of migrants.

5. ANALYSIS OF THE RESULTS

Results of the estimated *potential* wages of migrants are summarized in Table 5. After obtaining R_j^* and M_j^* through the CEM, we estimate a weighted Mincer equation with only residents of R_j^* and weights p_j, and use the estimated coefficients to measure the human capital value of migrants' characteristics in the state in which they were living in 2005. This exercise allows us to estimate the potential wage for each migrant. Then, each migrant would have a current wage (given by the data) and a potential wage (wage that the migrant would have earned in 2010 if he/she would have decided to stay in the same place as in 2005).

Table 5 shows the average of the wage differentials in states with low, mid- and high levels of violence, for migrants coming from states with low, mid- and high levels of violence. For example, the first cell in the upper left side shows the average wage differential in states with low levels of violence for migrants coming from states with low levels of violence. The next cell horizontally shows the average wage differential in states with mid-level of violence for migrants coming from states with low levels of violence.

<Table 5 here>

Results show initial evidence to support the hypothesis that the differential wages reflect the violence conditions in each of the states: potential wages in high-violence states are higher than wages in low-violence states for the same pool of migrants. On the other side, the differences on wages for migrants keeping its residence in states with the same level of violence (diagonal) are not significant. We also observe that the place of origin is also important to determine the wage differentials: migrants coming from high-violence states require a significant higher wage if they move toward medium or high-violence states than if they move to low-

violence states (the wage differential for the former case is roughly 20%, while it is only 6% for the former case).

Migrants coming from states categorized as high-violence states have lower wage differentials if they decide to migrate either to low-, mid- or high-violence states, when compared to the wage differential that a migrant coming from a low-violence state would have. For example, migrants coming from a state categorized as a high-violence state would have a wage premium of 6.44% on average if she/he decides to go to a state categorized as a low-violence state. On the other side, this premium is 42.99% for migrants coming from a low-violence state moving to another low-violence state.

The migration flows to violent states also show the demand of migrants for a higher economic compensation when moving to a state with a high level of violence. Migrants moving from low- to high-violence states demand a salary increase of 59.56%, while this compensation is only of 20.83% when the state of origin is also a high-violence state. This result shows workers seem to capitalize the safety level in their wage differential in the same line than our hypothesis establishes. However, we know that average comparison is not enough; then we move toward probability models to control by other factors.

Once the potential wages are estimated, logit models are used to estimate the probability of migration controlling for the level of violence of the states of origin and destination. Table A.1 in the appendix shows the results of the first model estimated. In all columns, the dependent variable is a binary variable equal to one if the migrant moved from a nonviolent state to a violent state (*L05toH10*), and zero if the migrant moves from a nonviolent state to other nonviolent state (*L05toL10*). Column A just includes as independent variable the wage

differential, column B includes some demographic and socioeconomic controls, and column C also controls for the differences in the price index between origin and destination.

Figure 2 shows the predicted probability of these variables instead of the parameters reported in Table A.1 evaluated at different levels of the wage differential given the non-linearity of probability models. As most of the literature indicates, the probability of migrating from nonviolent to violent states increase when the wage differential increases, and this increase is smaller the greater the wage differential is. Moreover, when the estimations control for cost of living, the standard errors are improved. As observed in the bottom left graph, a wage differential of 20% generates an average probability of 0.48 while an increment of 60% generates an average probability of 0.6. Complementary to Figure 2, Figure 3 shows the first partial derivative of the wage differential on the probability of migration evaluated in different points of the wage differential distribution for the three models. Analyzing the bottom left graph on Figure 3, we observe that the marginal effect of the migration probability is always positive for almost any wage differential. Its maximum effect is achieved when the wage differential is around 20%. At this point we see the greatest effect on the migration probability from nonviolent to violent states. Summarizing, we evaluate the average marginal effect of the wage differentials on the predicted probability: the average marginal effect of a change of 1% in the wage differential is an increase in 0.004 in the migration probability. This means that an increase of 25% in the wage differential would increase the probability of migration by 10%. These results are in line with our hypothesis: those migrants who move toward high-violence states must be strongly compensated by a wage premium. However, in order to prove it, we also need to analyze the role of the wage differential for those migrants moving from high- to low-violence states.

<Figure 2 and Figure 3 here>

Table A.2 in the appendix show the logit estimates of the price differential (column A), including other demographic and socioeconomic variables (column B), and controlling by the price index (column C) with a binary dependent variable equal to one if the migrant moved from a violent to a nonviolent state (*H05toL10*), and equal to zero if the migrant moved from a violent to another violent state (*H05toH10*). Such as we did in the previous case, the results are shown graphically in Figure 4 and the first derivative of the wage differential in the probability of migration is shown in Figure 5. Again, the results suggest the same trend as before and go according to the traditional migration models: a positive wage differential increases the probability of migration. However, its marginal effect is only of 0.0065701 implying that in order to get a migration probability of 10% from violent to nonviolent states, the wage differential should be of 15%. This figure, compared to the 25% average marginal effect estimated before for the migration flows from nonviolent to violent states, suggest that, although the wage in the place of destination is still important, this set of migrants is demanding less wage differential than the one demanded by people moving from nonviolent to violent states.

The marginal derivatives at different points of the wage differential distribution shown in Figure 5 corroborate this conclusion. An increase in the wage differential is only relevant to increase the migration probability until around 15-17%. After this point, the probability of migration is still positive, but it does not increase more, and the standard errors cross the zero line losing statistical significance. Both set of estimations support our hypothesis in the sense that, while wage differentials are always important for migrating, the required wage premium is greater for people moving from nonviolent to violent states. This result is robust even when

results control for individual socioeconomic characteristics and the price level differentials between states of origin and destination.

<Figure 4 and Figure 5 here>

For robustness of the results, Table A.3 compares both groups of migrants: the dependent variable is equal to one if the migrant is moving from a nonviolent state to a violent state (*L05toH10*), and equal to zero if she/he is moving from a violent state to a nonviolent state (*H05toL10*). Because in the previous models the wage differential coefficient was significant and positive in both cases, we could expect that migrants going to high-violence states must be overcompensated in comparison to those moving toward low-violence states. Again, the wage differential is still statistically significant and positive, meaning that for the group of migrants moving from low- to high-violence states, the economic compensation offered in the place of destination is more important than for the group of migrants moving from violent to nonviolent states. As observed in Figure 6, which shows the partial derivative of the wage differential over the migration probability in this model, the effect of the wage differential is increasing until it is almost 80%. An increase in the wage differential of 20% would generate an increase in the probability of migration from nonviolent to violent states of 15% (when compared to the migration probability in the other direction).

<Figure 6 here>

These results suggest that people migrating from violent states to nonviolent states are not interested only in the economic opportunities or in the cost of living in the place of destination. If the economic opportunities are worse, or the cost of living is more expensive, they still migrate, suggesting that there are additional factors that are driven this migration. Moreover,

these results could support the idea that violence is seen as a negative amenity captured by renting prices: a less violent state could have higher rents than a violent state (and therefore, a higher price differential).

6. CONCLUSIONS

This article attempts to recognize the existence of internally displaced populations in Mexico. With no data to quantify them, and no official recognition of their existence, it is not possible to design policies in order to provide them with solutions and alternatives to return to their places of origin. By using data from the Housing and Population Census, we estimate the probability of migration from violent to nonviolent states, and from nonviolent states to violent states. This exercise allows us to identify two different migration phenomena in Mexico. The first one is an economic migration that behaves exactly as the economic migration theory predicts: an economic compensation 25% greater in the place of destination, compared to the place of origin, would increase migration from nonviolent to violent states in 10%. Our hypothesis is that people moving to violent states are demanding greater economic gains in order to compensate for the safety losses.

The second migration phenomenon observed in Mexico is when people move from violent to nonviolent states: the wage differential is still important since probability of migration increases the higher are the economic opportunities in the place of destination. However, its significance (economically and statistically) is much lower than in the first migration phenomenon identified: to increase the migration probability from violent to nonviolent states in 10%, the economic compensation offered in the place of destination should be 15% greater than the one offered in the place of origin. Moreover, people moving out from violent states still migrate even if the cost of living (rent index) is more expensive in the place of destination.

Rental prices are capturing the positive (o negative) amenities in local markets, and migrants consider these amenities in their migration decisions. These results suggest that the conventional migration theories are not able to explain this second migration phenomenon from violent to nonviolent states. And our hypothesis is that these migrants are looking for safety and are willing to loose economic opportunities in order to flee away from violence.

It is not easy to link our results to a displacement effect in Mexico and more research is needed in the topic, particularly more accurate data. However, the fact that economic variables are not able to explain migration flows coming from violent states, in the same way that they explain migration flows from nonviolent states, suggests that a different migration phenomenon is observed when people move out from violent states, and displacement by violence could be considered as one of the explanations.

There are two main costs associated with this displacement. The first one is the humanitarian crisis generated because of the poor living conditions they face in their destinations. In Mexico, they, in general, do not receive humanitarian assistance by the government and, in case they do, it was under deplorable conditions. Ensuring their return to their hometowns is related to the second cost. Given the humanitarian crisis created by their poor living conditions as IDPs, the main solution, both for them and for the government would be to provide a safety return. However, even if the legislation is changed to guarantee this return, as it was the case in Colombia, in the practice the situation is more problematic.

This paper opens several aspects to be improved in future research. First, a simple rule to define the level of violence in each state was proposed. New research could operate with different thresholds or with refined information that allows to decompose which type of crime is really relevant for migrants. Second, new research could incorporate also the potential effect of

amenities provided by states. Here, Roback (1982) claims that amenities affect both demand and supply, and its effect is capitalized by wages. Finally, we focus our research at the state level, leaving out all the heterogeneity among municipalities. Our decision was taken because we are estimating potential wages individually, and the estimation to the 2,457 municipalities in Mexico was too costly both in terms of computation and time.

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[i] http://www.idpguidingprinciples.org/

[ii] According to a special report conducted in Sinaloa by Animal Político, in collaboration with Insight Crime in 2013 (Sandoval Alarcón, 2013a), when the Norwegian Refugee Council published its report in 2011 estimating more than 160,000 IDPs in Mexico, the *Secretario de la Gobernación*, Alejandro Poiré, argued that the government did not know the methodology of the study. The Subsecretary of Legal Services and Human Rights of the *Secretaría de la*

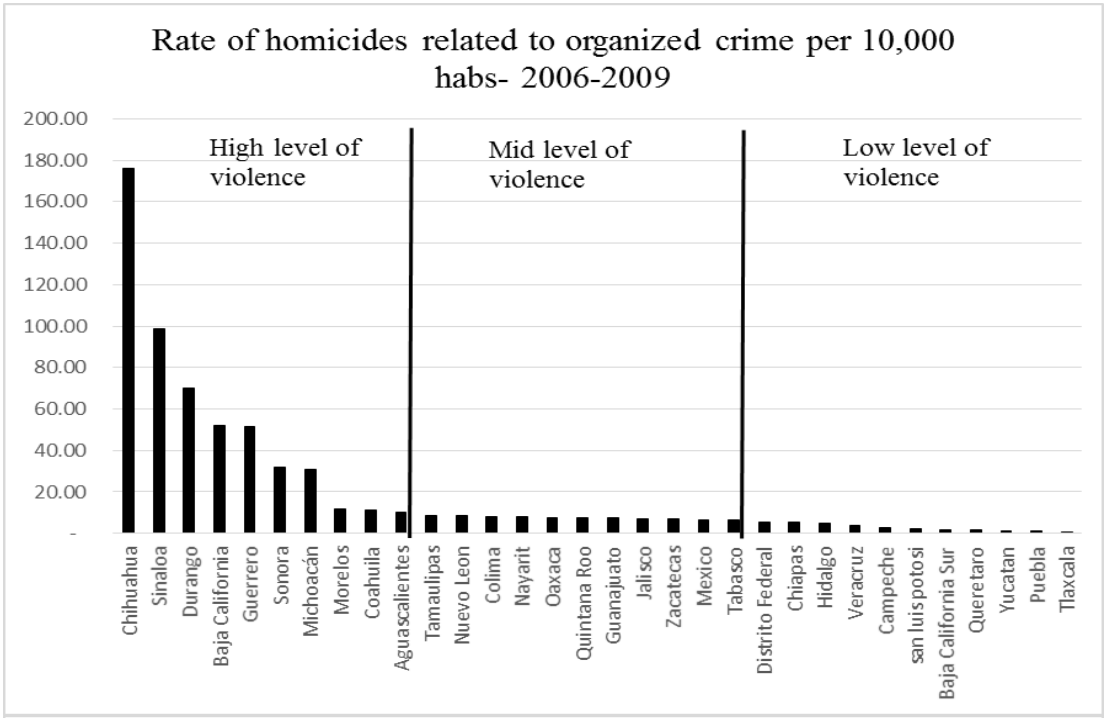
Gobernación, argued that, given the lack of data and evidence, it was not possible to recognize that Mexico was suffering from an IDP problem.

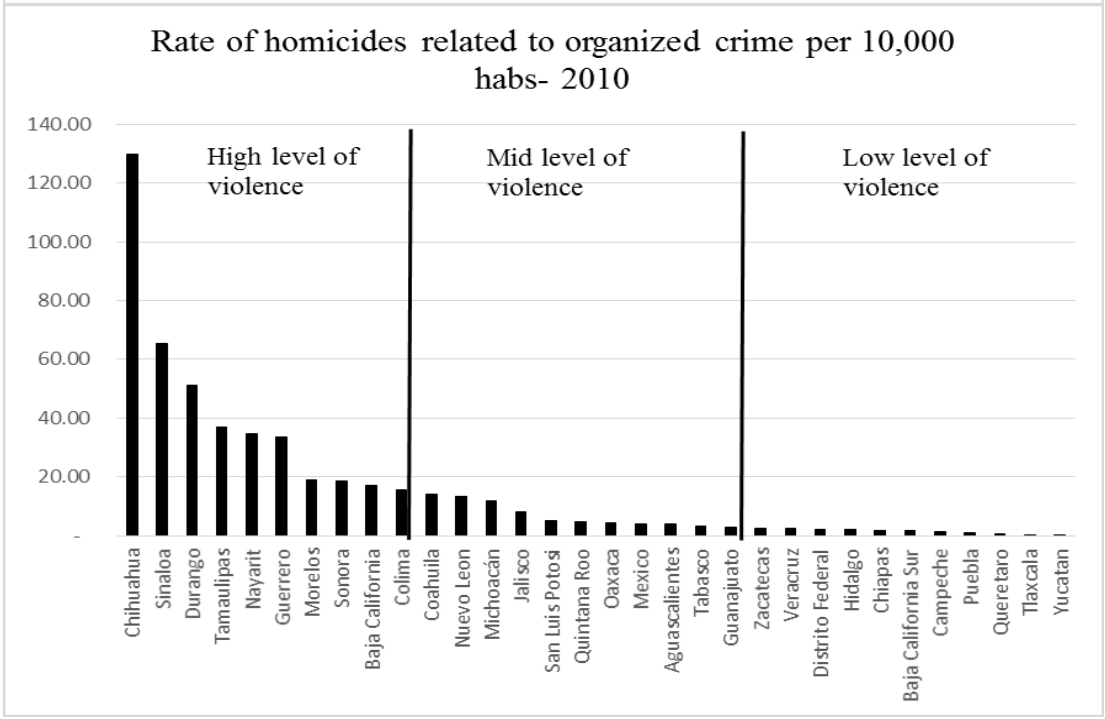
[iii] Regrettably, the data does not allow us to identify people who migrate and went back during the same time period.

[iv] Quinn (2006) describes the limitations and the strengths of estimating wage differentials using different methods.

[v] Average rent payments are taken from the Income and Expenditures Survey of 2010.

Figure 1: States ranked by their rate of homicides related to organized crime per 100,000 habitants in 2006 (left panel) and 2010 (right panel). Source: National Security Council (CSN). Graphs prepared by the authors





Source: National Security Council.

Table 1: Total number of migrants from L-M-H violent states migrating to L-M-H violent states. Percentage of total residents in L-M-H violent states in 2010 in parenthesis.

	Destination: low-violence state	Destination: mid-violence state	Destination: high violence state	Total
Migrants coming from low-violence states	344,623 (2.59%)	775,934 (5.83%)	217,592 (1.64%)	1,338,149 (9.77%)
Migrants coming from mid-violence states	505,758 (2.86%)	329,786 (1.86%)	195,820 (1.11%)	1,031,364 (6.45%)
Migrants coming from high-violence states	168,205 (2.04%)	211,182 (2.56%)	269,360 (3.26%)	648,747 (7.15%)
Total	1,018,586 (2.59%)	1,316,902 (3.35%)	682,772 (1.74%)	3,018,260 (7.69%)

Source: sample of the Housing and Population Census 2010 (the estimations multiply the sample observations by their expansion factors).

Table 2: Summary of statistics for residents and for migrants from low-, mid- and high-violence states.

Migrants coming from low-, mid- and high-violence states before 2010						
Variable description	Column A Low violence	Column B Mid-violence	Column C High violence	Column D differences A&B	Column E differences A&C	Column F differences B&C
Number of observations	85,535	74,489	44,921			
Wage 2010	6,274.22 (10,979.51)	6,429.3 (11,688.73)	6,075.73 (10,781.92)	155.08** [58.06]	-198.49** [65.27]	353.57*** [69.79]
Wage 2005	4,316.82 (2,440.45)	4,425.87 (2,467.81)	4,399.63 (2,270.10)	109.05*** [12.40]	82.81*** [14.008]	-26.24^ [14.43]
Gender	0.66 (0.42)	0.67 (0.46)	0.69 (0.46)	0.015*** [0.002]	0.034*** [0.002]	0.018*** [0.002]
Age	33.07 (11.65)	33.17 (11.46)	32.62 (11.29)	0.10^ [0.05]	-0.44*** [0.067]	-0.55*** [0.068]
Education (1)	1.66 (0.81)	1.64 (0.81)	1.58 (0.79)	-0.027*** [0.004]	-0.084*** [0.004]	-0.056*** [0.004]
Is he/she married? (living with someone)	0.63 (0.48)	0.64 (0.48)	0.64 (0.47)	0.009*** [0.002]	0.009*** [0.002]	0.0004 [0.0028]
Size of the municipality he/she is living	2.68 (1.21)	2.53 (1.21)	2.51 (1.19)	-0.145*** [0.006]	-0.168*** [0.007]	-0.022* [0.007]
Is the interviewed the household head?	0.50 (0.50)	0.51 (0.49)	0.49 (0.50)	0.0029 [0.0025]	-0.008* [0.002]	-0.011*** [0.002]

Source: Sample of the Housing and Population Census of 2010.

Standard deviations in parenthesis and standard errors in brackets.

$^{\wedge}p< 0.10$, $^{*}p< 0.05$, $^{**}p< 0.01$, $^{***}p< 0.001$

(1) edu=1 (low education, no high-school degree); edu=2 (mid-level of education, no bachelor's degree); edu=3 (high education, bachelor's, master's and PhD degrees)

Table 3: number of observations included in R_j and M_j, and in R_j^* and M_j^*, and the CEM weights for residents selected in R_j^*.

					Percentiles of the $p_j \neq 0 \; \forall R_j^*$		
	R_j	R_j^* (% of total)	M_j	M_j^* (% of total)	25th percentile	50th percentile	75th percentile
Totals (32 states)	2,790,530	2,699,953 (96.8%)	259,632	258,583 (99.6%)			
Average	87,204	84,374 (94.98%)	8,114	8,021 (99.4%)	0.5367	0.8557	1.2805
Median	67,489	54,177 (95.33%)	6,087	6.069 (99.5%)	0.5362	0.8709	1.2812

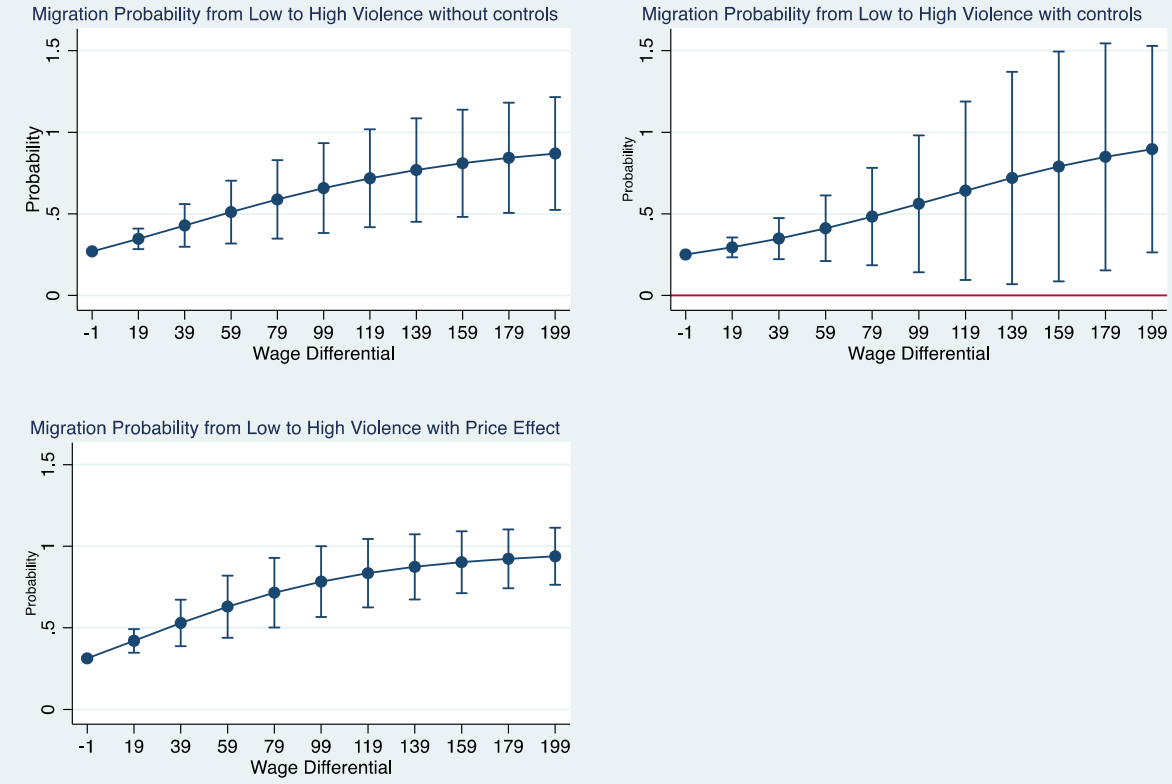
Table 4: Migration flows matrix

		destination		
		Low violence states	Mid-violence states	High violence states
Origin	Low violence states	L05toL10	L05toM10	L05toH10
	Mid violence states	M05toL10	M05toM10	M05toH10
	High violence states	H05toL10	H05toM10	H05toH10

Table 5: Average of the wage differentials (in percentages and corrected by the price index) for migrants coming from low, mid-, and high violence states and going to low, mid-, and high violence states. Standard deviation in parenthesis.

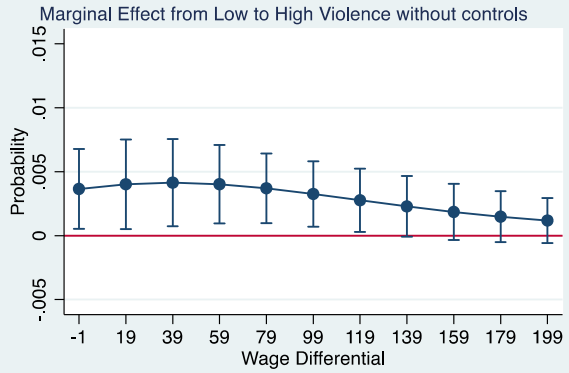
	Wage differentials in low-violence states	Wage differentials in mid-violence states	Wage differentials in high-violence states
Migrants coming from low-violence states	0.4299 (1.6025)	0.5866 (2.3138)	0.5956 (3.8501)
Migrants coming from mid-violence states	0.2367 (2.3751)	0.3627 (1.3843)	0.4392 (1.4676)
Migrants coming from high-violence states	0.0644 (1.6009)	0.2099 (2.4786)	0.2083 (1.1175)

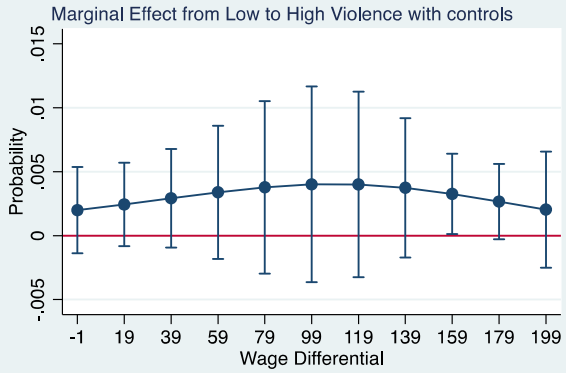
Figure 2: Migration probability from low to high violence states (L05toH10) with controls, and with and without correcting by the price index.

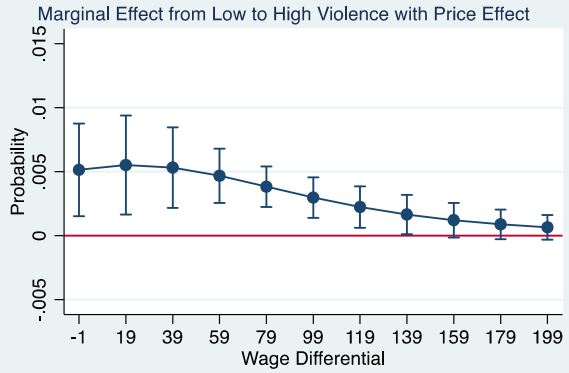


Source: Prepared by the authors

Figure 3: Marginal effects of the wage differential on the migration probability evaluated at different points of the wage differential distribution when migrants move from states with low levels of violence to states with high levels of violence.

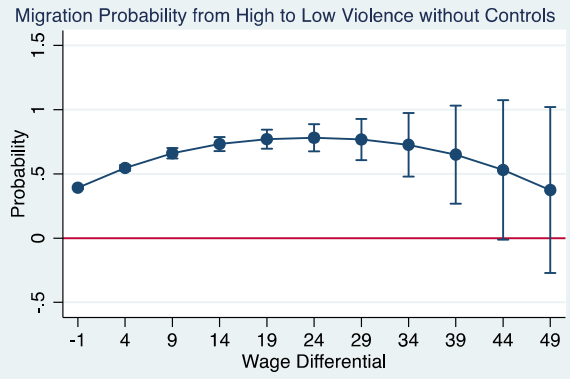


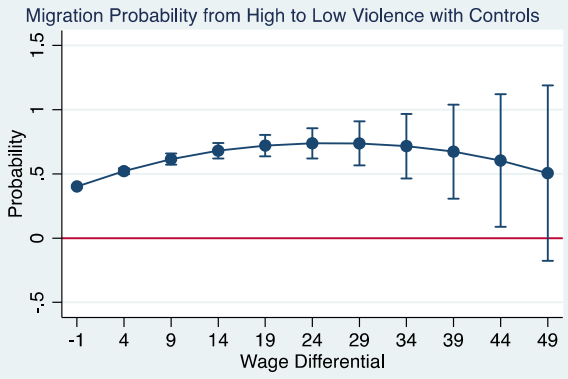


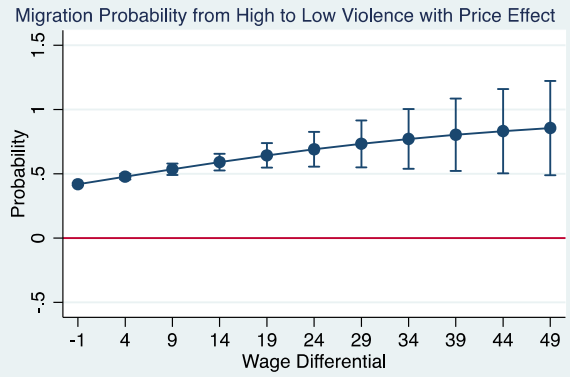


Source: Prepared by the authors

Figure 4: Migration probability from high to low violence states (H05toL10) with controls, and with and without correcting by the price index.

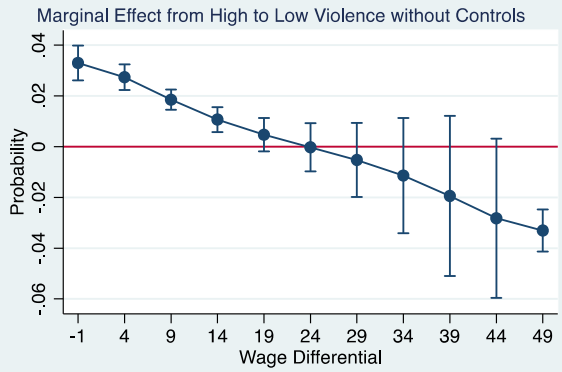


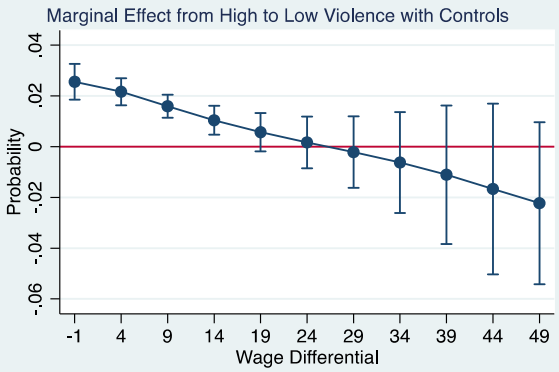


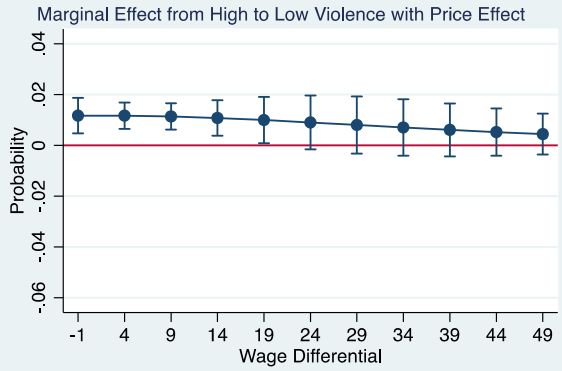


Source: Prepared by the authors

Figure 5: Marginal effects of the wage differential on the migration probability evaluated at different points of the wage differential distribution when migrants move from states with high levels of violence to states with low levels of violence.

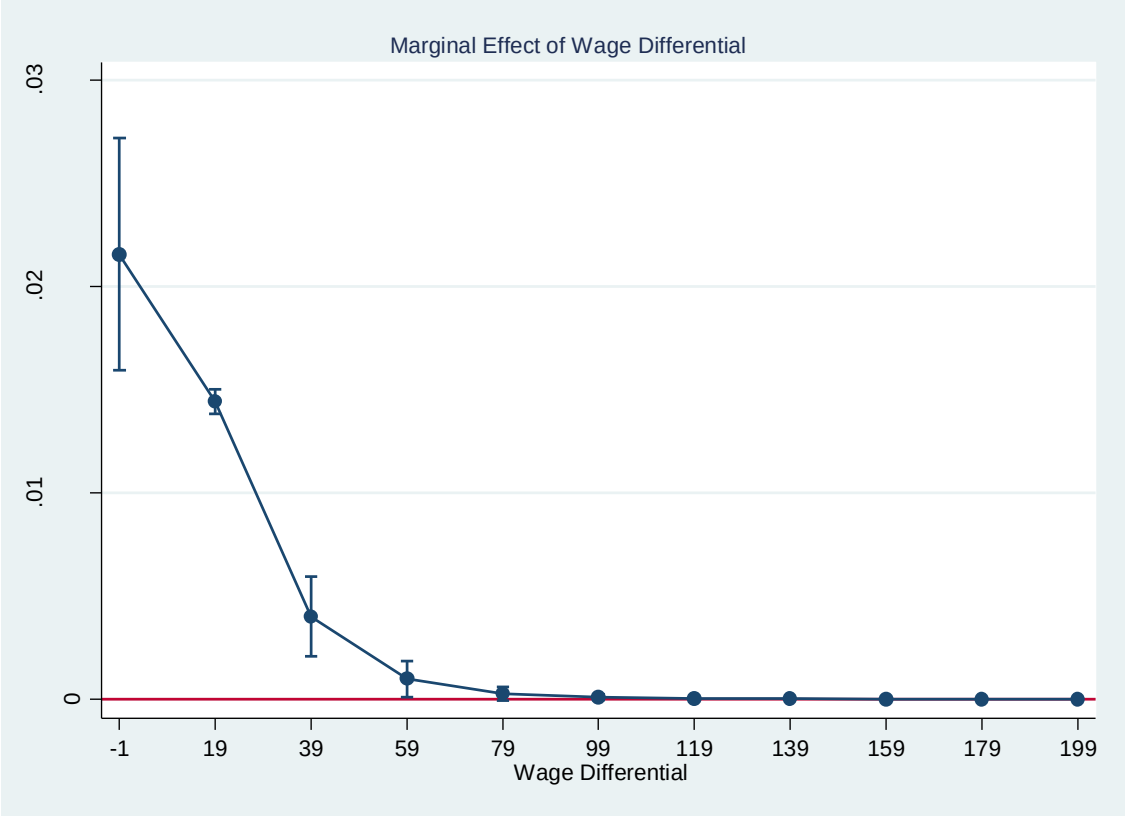






Source: Prepared by the authors

Figure 6: Marginal effects of the wage differential on the migration probability evaluated at different points of the wage differential distribution when migrants from nonviolent states to violent states are compared to migrants moving in the opposite direction.



APPENDIX- REGRESSION RESULTS

Table A.1: Logit results for the probability of migration from low-violence states to high-violence states, not controlling and controlling by the regional price index (dependent variable=1 if migrant moved from low-violence states to high-violence states), 0 if migrant moved from a low-violence state to another low-violence states)

	COLUMN A No controls and no controlling by the price index	**COLUMN B No controlling by the price index**	**COLUMN C Controlling by the price index**
Dep. Var (binary)	Migration from low to high-violence states L05toH10	Migration from low to high-violence states L05toH10	Migration from low to high-violence states L05toH10
Wage differential & price index			
Wage differential	0.02*	0.01	0.02**
Wage differential^2	-0.00	0.00	-0.00
Price index			-0.00
Price index^2			-1.05***
Demographics			
Female		0.00	0.00
Male		0.09**	0.06*
Age		-0.04***	-0.04***
Age^2		0.00***	0.00***
Not married (living with partner)		0.00	0.00
Married (living with partner)		-0.05	-0.15***
Size of the municipality		0.35***	0.50***
Not HH head		0.00	0.00
HH head		0.09**	0.07*
Education			
No school		0.00	0.00
Pre-school		-0.06	0.13
Primary school		-0.27***	-0.21**
Secondary school		-0.19**	-0.14
High school		-0.13	-0.11
Basic		0.06	-0.08
Technical school		0.42	0.42

(primary school completed)			
Technical school (secondary school completed)		-0.10	-0.09
Technical school (high school completed)		-0.28*	-0.30**
Undergraduate (basic)		-0.34**	-0.29*
Undergraduate (professional)		-0.30***	-0.25**
Master's program		-0.27*	-0.14
PhD Program		0.03	0.09
Economic activity			
Mining, agriculture, energy		0.00	0.00
Construction		0.11	0.11
Manufacturing		0.25**	0.22**
Wholesale and retail sale		-0.11	-0.13
Transportation		0.16*	0.19**
Communications		0.17*	0.22*
Non-governmental services		-0.13	-0.12
Governmental services		0.73***	0.66***
Not specified economic activity		0.17*	0.31***
Constant	-0.98***	-1.26***	-1.12***
Number of observations	36,954	36,954	36,954
Pseudo R2	0.0002	0.0427	0.0960

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2: Logit results for the probability of migration from high-violence states to low-violence states, not controlling and controlling by the regional price index (dependent variable=1 if migrant moved from high-violence states to low-violence states), 0 if migrant moved from a high-violence state to another high-violence states)

	COLUMN A No controls and no controlling by the price index	**COLUMN B No controlling by the price index**	**COLUMN C Controlling by the price index**
Dep. Var (binary)	Migration from high to low-violence states	Migration from high to low-violence states	Migration from high to low-violence states
Wage differential & price index			
Wage differential	0.13***	0.11***	0.03
Wage differential^2	-0.00***	-0.00**	0.00
Price index			0.50***
Price index^2			0.47***
Demographics			
Female		0.00	0.00
Male		0.08**	0.12***
Age		0.02***	0.04***
Age^2		-0.00***	-0.00***
Not married (living with partner)		0.00	0.00
Married (living with partner)		-0.13***	-0.05
Size of the municipality		-0.21***	-0.38***
Not HH head		0.00	0.00
HH head		0.05	0.07*
Education			
No school		0.00	0.00
Pre-school		0.39	0.66*
Primary school		0.46***	0.56***
Secondary school		0.59***	0.75***
High school		0.68***	0.86***
Basic		-0.33	-0.12
Technical school (primary school completed)		0.90**	1.25***
Technical school		0.28*	0.53***

(secondary school completed)			
Technical school (high school completed)		0.69***	0.85***
Undergraduate (basic)		0.96***	1.03***
Undergraduate (professional)		0.92***	1.03***
Master's program		1.28***	1.32***
PhD Program		1.25***	1.29***
Economic activity			
Mining, agriculture, energy		0.00	0.00
Construction		-0.27***	-0.26***
Manufacturing		-0.35***	-0.28**
Wholesale and retail sale		-0.19*	-0.12
Transportation		-0.24**	-0.23**
Communications		-0.44***	-0.42***
Non-governmental services		-0.37***	-0.35***
Governmental services		-0.66***	-0.64***
Not specified economic activity		-0.49***	-0.56***
Constant	-0.30***	-0.42**	-0.83***
Number of observations	27,294	27,294	27,294
Pseudo R2	0.0028	0.0239	0.0812

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: Logit results for the probability of migration from low-violence states to high-violence states (dep. var=1), compared to the migration probability from high- to low-violence states (dep. var=0), controlling for economic and sociodemographic characteristics, and for the differences in the cost of living between places of origin and destination.

Dep. Var (binary)=1 if moving from low- to high-violence states; 0 if moving from high- to low-violence state	
Wage differential & price index	
Wage differential	0.09***
Wage differential^2	-0.00***
Price index	-1.74***
Price index^2	-0.02
Demographics	
Female	0.00
Male	-0.13***
Age	-0.10***
Age^2	0.00***
Not married (living with partner)	0.00
Married (living with partner)	-0.09**
Size of the municipality	0.60***
Not HH head	0.00
HH head	0.07
Education	
No school	0.00
Pre-school	-0.31
Primary school	-0.47***
Secondary school	-0.59***
High school	-0.58***
Basic	0.68
Technical school (primary school completed)	0.14
Technical school (secondary school completed)	-0.18
Technical school (high school completed)	-0.60***
Undergraduate (basic)	-0.60***
Undergraduate (professional)	-0.61***
Master's program	-0.52***
PhD Program	-0.66*
Economic activity	
Mining, agriculture, energy	0.00
Construction	0.26**
Manufacturing	0.19
Wholesale and retail sale	0.03

Transportation	0.22*
Communications	0.02
Non-governmental services	-0.05
Governmental services	0.95***
Not specified economic activity	0.47***
Constant	0.57**
Number of observations	22,025

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$